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STATE-OF-THE-ART PAPER

CLINICAL RESEARCH

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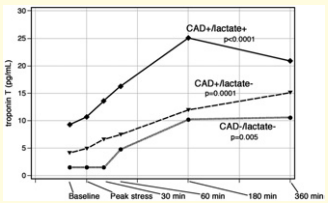


BIOMARKERS

Troponin T May Be Released With Ischemia, Rather Than Only With Myonecrosis **2398**

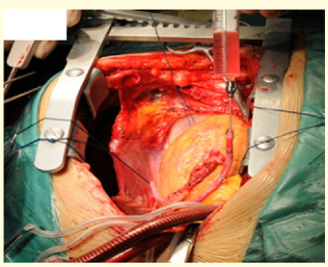
Aslan T. Turer, Tayo A. Addo, Justin L. Martin, Marc S. Sabatine, Gregory D. Lewis, Robert E. Gerszten, Ellen C. Keeley, Joaquin E. Cigarroa, Richard A. Lange, L. David Hillis, James A. de Lemos

Turer and colleagues studied whether ischemia without necrosis would result in the release of cardiac troponin T (cTnT). Patients were referred for diagnostic catheterization and rapid atrial pacing with serial measurements of cTnT from the coronary sinus and peripheral blood. cTnT concentrations were found to increase with pacing. Although peripheral cTnT concentrations tended to be higher for patients with atherosclerosis and lactate elution, the relative and absolute changes were similar for those with and without atherosclerosis. The higher sensitivity of current-generation cTnT assays can detect ischemia, without frank infarction, even among patients without atherosclerosis.

Editorial Comment: Harvey D. White, p. 2406

HEART FAILURE

Bone Marrow Mononuclear Cells Delivered Through Graft Vessel During CABG May Improve Outcomes **2409**

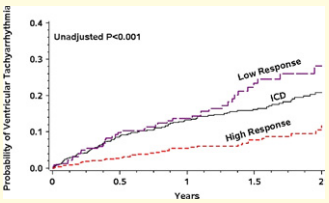


Shengshou Hu, Sheng Liu, Zhe Zheng, Xin Yuan, Lihuan Li, Minjie Lu, Rui Shen, Fujian Duan, Xiaoling Zhang, Jun Li, Xuewen Liu, Yunhu Song, Wei Wang, Shihua Zhao, Zuoxiang He, Hao Zhang, Keming Yang, Wei Feng, Xin Wang

Bone marrow mononuclear cells (BMMNCs) are easy to harvest and have the potential to improve heart function by inducing angiogenesis and myocardial regeneration. Hu and colleagues hypothesized that delivering the cells into the vasculature during cardiac arrest would improve their uptake and dispersal compared with direct intramyocardial injection. Patients with ischemic cardiomyopathy undergoing coronary artery bypass grafting (CABG) were randomized to autologous BMMNC infusion through the newly made bypass graft or placebo. At 6 months, there were significant improvements in left ventricular ejection fraction, left ventricular end-systolic volume index, wall motion score index, and 6-min walking distance in patients assigned to BMMNC.

(*continued on page A-30*)

CARDIAC RESYNCHRONIZATION THERAPY



Reverse Remodeling Reduces the Risk of Ventricular Tachyarrhythmias in CRT Patients 2416

Alon Barsheshet, Paul J. Wang, Arthur J. Moss, Scott D. Solomon, Amin Al-Ahmad, Scott McNitt, Elyse Foster, David T. Huang, Helmut U. Klein, Wojciech Zareba, Michael Eldar, Ilan Goldenberg

Barsheshet and colleagues evaluated the relationship between echocardiographic response to cardiac resynchronization therapy (CRT) and the risk of ventricular tachyarrhythmias (VTA). The rates of VTA were compared between those who had echocardiographic remodeling, defined as a ≥25% reduction in left ventricular end-systolic volume at 1 year, to those who had no response, and to those who received an implantable cardioverter-defibrillator (ICD) only in the MADIT-CRT (Multicenter Automatic Defibrillator Implantation Trial–Cardiac Resynchronization Therapy). The risk of VTA was lowest in echocardiographic responders (12%) followed by ICD-only patients (21%), and was highest among nonresponders (28%). These findings suggest that the process of reverse remodeling induced by CRT results in both mechanical and electrical stability of the left ventricle.

Editorial Comment: Anne B. Curtis, p. 2424

CARDIAC IMAGING

Meta-Analysis of the Long-Term Prognostic Value of Coronary CT Angiography 2426

Fabian Bamberg, Wieland H. Sommer, Verena Hoffmann, Stephan Achenbach, Konstantin Nikolaou, David Conen, Maximilian F. Reiser, Udo Hoffmann, Christoph R. Becker

Bamberg and colleagues conducted a systematic review and meta-analysis to determine the predictive value of coronary computed tomography (CT) angiography for subsequent cardiovascular events. A total of 11 eligible papers, including 7,335 participants, were combined. The presence of ≥1 significant stenosis was associated with a 10-fold higher risk of subsequent events including revascularization and a 6-fold higher risk of events excluding revascularization. Further analysis revealed that the following findings influenced the likelihood of subsequent events: 1) the presence of at least 1 coronary artery stenosis ≥50% diameter; 2) the number of coronary segments with a stenosis ≥50%; 3) left main disease; 4) the presence of any detectable atherosclerotic plaque, regardless of severity; and 5) the number of segments containing any nonobstructive plaque, calcified, noncalcified, and mixed plaque.

(continued on page A-31)

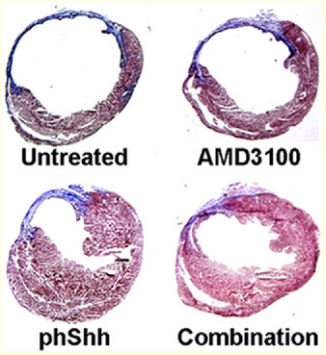
CONGENITAL HEART DISEASE

Late Status of Fontan Patients: Effects of Surgical Fenestration 2437

Andrew M. Atz, Thomas G. Travison, Brian W. McCrindle, Lynn Mahony, Michael Quartermain, Richard V. Williams, Roger E. Breitbart, Minmin Lu, Elizabeth Radojewski, Renee Margossian, Wesley Covitz, Welton M. Gersony, for the Pediatric Heart Network Investigators

Creation of a systemic to pulmonary venous atrial level communication (fenestration) at the time of a Fontan procedure may improve acute hemodynamics, but the long-term outcomes have not been well described. Fenestration was performed in two-thirds of patients reviewed by Atz and colleagues. After multivariable adjustment, the fenestrated group had a shorter length of hospital stay. At a median of 8 years after Fontan, the fenestration remained open in 19% of subjects, with 59% of those closed by catheter intervention and 40% with apparent spontaneous closure. Functional health status, exercise performance, echocardiographic variables, and risk of stroke or thrombosis did not differ in those with an open or closed fenestration. These results confirm the early benefits of surgical fenestration and its long-term safety.

PRE-CLINICAL RESEARCH



PRE-CLINICAL RESEARCH

Gene Transfer and Progenitor Cell Mobilization Improve Post-MI Recovery in a Mouse Model 2444

Jérôme Roncalli, Marie-Ange Renault, Jörn Tongers, Sol Misener, Tina Thorne, Christine Kamide, Kentaro Jujo, Toshikazu Tanaka, Masaaki Ii, Ekaterina Klyachko, Douglas W. Losordo

Sonic hedgehog (Shh) gene transfer improves myocardial recovery by up-regulating angiogenic genes and enhancing the incorporation of bone-marrow–derived progenitor cells (BMPCs) in infarcted myocardium. In this report, Roncalli and colleagues investigated whether the effectiveness of Shh gene therapy could be improved by inducing progenitor cell mobilization from the bone marrow with AMD3100 in a mouse model. Mice were treated with Shh, AMD3100, or both. Combination therapy enhanced cardiac functional recovery (i.e., left ventricular ejection fraction) and was associated with less fibrosis, greater capillary density, and enhanced BMPC incorporation.